



ABSTRACT AND BIOGRAPHY

Requirements Driven versus Risk Informed Design

Over the past 30 years NASA has been engaged in the operation of the Shuttle. The Shuttle design was developed in the 1970s and was, because of its reusable character, a relatively mass unconstrained design. The lack of mass constraints and the relatively limited mission allowed for the requirements to be set strictly and rules of thumb such as FO-FO-FS followed in every subsystem where ever possible and with exceptions being reviewed and accepted at high levels. This penchant for requirements as a driver is referred to as "requirements driven" or "rule driven" design.

In the mass constrained environment of the Ares/Orion/Altair system, rule driven design can either result in an excessively massive system, or one that is globally riskier because critical areas cutting across system boundaries cannot access mass budgets that might result in a less risky global design.

Altair Project management, because of the uniquely mass constrained design environment of the lunar landing vehicle, adapted the alternative strategy of a zero-based risk informed design process. Here the design began not with a set of individual requirements but with a set of functional requirements per mission phase, and the development of a minimal mass equipment set that might satisfy those requirements. In this case, the subsystem designers were forced to consider synergistic options to achieve risk robustness beyond simple identical unit redundancy and to revisit decisions made at every level of mass addition up until the mass limit changing individual subsystem complements to ensure optimal global integrated design risk.

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Mr. Rust is the Safety, Reliability and Quality Assurance Lead for the Constellation Lunar Lander Project. In this capacity, he is responsible for managing the tasks related to identifying, prioritizing, and helping to identify the mitigation of risks to the safety of the Lander crew, and to Lander mission success.

Prior to this position, Mr. Rust was the Safety and Mission Assurance (S&MA) Advanced Projects Group Lead where he was the lead for SR&QA on the CEV proposal development effort, and supported the Constellation Program in the development of Safety and Mission Assurance documents. Mr. Rust was the S&MA lead for the TransHab Inflatable Module Project, the Portable Hyper baric Chamber, and Human Centrifuge Projects.

Mr. Rust was awarded the NASA Exceptional Service Medal for his work on safety and reliability on the Space Launch Initiative Program.